



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,269	09/25/2003	Yukiyasu Tsunoo	K2291.0109	3240
32172 7590 12/11/2007 DICKSTEIN SHAPIRO LLP 1177 AVENUE OF THE AMERICAS (6TH AVENUE) NEW YORK, NY 10036-2714			EXAMINER NGUYEN, MINH DIEU T	
			ART UNIT 2137	PAPER NUMBER
			MAIL DATE 12/11/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/669,269

Applicant(s)

TSUNOO, YUKIYASU

Examiner

Minh Dieu Nguyen

Art Unit

2137

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-7, 22-27 and 34 is/are pending in the application.
- 4a) Of the above claim(s) 8-21, 28-33, 35 and 36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-2, 4-7, 22, 24-27 and 34 is/are rejected.
- 7) ☒ Claim(s) 3 and 23 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date: _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. This office action is in response to the communication dated 09/28/2007 with the amendments to claims 1, 6, 22, 26 and 34.
2. The election of claims 1-7, 22-27 and 34 was acknowledged in the previous office action, however all non-elected claims (claims 8-21, 28-33 and 35-36) are not clearly denoted with correct identifier (i.e. withdrawn or cancelled). As such, the Examiner choose to make it clear on the record.

Claims 1-7, 22-27 and 34 are pending.

### ***Response to Arguments***

3. Applicant's arguments filed 9/28/07 have been fully considered but they are not persuasive. The Applicant argues on page 14 of the Remarks "Claim 34 contains the limitation of generating transformation tables based on whether the targeted transformation table exhibits a trend of increasing in the number of operation entries as a length of encryption time becomes longer" and Page does not disclose or suggest this limitation.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., generating transformation tables based on whether the targeted transformation table exhibits a trend of increasing in the number of operation entries as a length of encryption time becomes longer) are not recited in the rejected claim(s). Although the

claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Claim 34 recites "generating the transformation tables each of which contains a predetermined number of entries" which is reasonably interpreted as S-boxes in Page, "wherein a targeted transformation table is previously identified from the transformation tables depending on whether the targeted transformation table exhibits a trend of increasing in the number of operation entries as a length of encryption time becomes longer", it appears that it is the characteristic of selecting targeted transformation table, it has no direct affect on generating the transformation tables. Thus, it is reasonably interpreted as CPU cache misses indicate the targeted data must be loaded from main memory into the cache, as such a delay is generated resulting in variations in encryption time (Page, sections 2-3, pages 2-5).

### ***Claim Objections***

4. The objections of claims 1, 6, 22, 26 and 34 have been withdrawn based on the filed amendments.

5. Claims 22-27 are objected to because of the following informalities:

a) As to claim 22, the phrase "stored on a computer readable media" should be --stored on a computer readable **medium**--, "the program comprising steps of" should be --comprising steps of--.

b) As to claims 23-27, the phrase "The data encryption program according to claim 22" should be –The data encryption program **stored on a computer readable medium** according to claim 22--.

Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

6. The rejections under 35 U.S.C 101 have been withdrawn based on the filed amendments.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

8. Claims 1-2, 4, 7, 22, 24, 27 and 34 are rejected under 35 U.S.C. 102(a) as being anticipated by Page (Theoretical Use of Cache Memory as a Cryptanalytic Side-Channel).

a) As to claim 34, Page discloses a data encryption method for performing encryption/decryption of a given plain/ciphertext using transformation tables which transforms bit strings of the given plain/cipher text (i.e. DES encryption algorithm whose core is described as pseudo-code in Fig. 2. S represents the whole S-box or substitution

transformation, Page: section 4, 4.1 and 4.2), the method comprising steps of: generating the transformation tables (i.e. S-boxes), each of which contains a predetermined number of entries, wherein a targeted transformation table is previously identified from the transformation tables depending on whether the targeted transformation table exhibits a trend of increasing in the number of operation entries as a length of encryption time becomes longer (i.e. CPU cache misses indicate the requested/targeted data must be loaded from main memory into the cache, as such a delay is generated resulting in variations in encryption time, Page: sections 2-3, pages 2-5); loading at least one part of the targeted transformation table into a cache memory of a computer (i.e. randomly loading S-box elements, Page: section 5.1); and performing data transformation of bit strings of the given plain/cipher text (Page, section 7).

b) As to claims 1 and 22, these claims are direct to a hardware/software implementation of the method of claim 34 and are rejected by a similar rationale applied against claim 34 above.

c) As to claim 2, Page discloses the entry loading section loads the at least one part of the targeted transformation table into the cache memory before the encryption/decryption of the given plain/cipher text (Page: section 5.1.).

d) As to claims 4 and 24, Page discloses the entry loading section loads all transformation tables with priorities into the cache memory, in which a transformation table with higher priority is left longer in the cache memory, wherein higher priority is

assigned to the targeted transformation table compared with the other transformation tables (Page: section 2, second paragraph).

e) As to claims 7 and 27, Page discloses the targeted transformation table is identified by calculating a use rate of a number of operation entries to a total number of entries for each of the transformation tables (i.e. cache miss is the data not contained in the cache and must be fetched from main memory (Page: Section 2, page 4) and the example attack is based on accesses to the S-box structures with the value of these S-boxes is fetched from a table in memory. This means the access to memory will be routed through the cache and produce an access profile without which such attacks are useless (Page: section 3, page 5, first paragraph) and selecting a transformation table having a smaller use rate as the targeted transformation table (i.e. the smaller the use rate the more appropriate to select and store those as the targeted transformation table because if the use rate is high, then it should be considered as cache hit, Page: section 2).

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 5 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Page (Theoretical Use of Cache Memory as a Cryptanalytic Side-Channel) in view of Lee (6,654,874).

Page discloses the method of claim 2, however he is silent on the capability of having the entry loading section loads the at least one part of the targeted transformation table into the cache memory at a plurality of timings before the encryption/decryption of the given plain/cipher text. Lee is relied on for the teaching of having the entry loading section loads the at least one part of the targeted transformation table into the cache memory at a plurality of timings before the encryption/decryption of the given plain/cipher text (Lee: col. 9, lines 1-15). It would have been obvious to one of ordinary skill in the art at the time of the invention to employ the use of having the entry loading section loads the at least one part of the targeted transformation table into the cache memory at a plurality of timings before the encryption/decryption of the given plain/cipher text in the system of Page, as Lee teaches so as to increase performance loss and current consumption of the microcomputer (Lee: col. 9, lines 22-23).

11. Claims 6 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Page (Theoretical Use of Cache Memory as a Cryptanalytic Side-Channel) in view of Ng et al. (6,725,329).

Page discloses the method of claim 1, however he is silent on the capability of having a management table containing a plurality of management entries, each



corresponding to the entries of the targeted transformation table, each management entry indicating whether a corresponding entry of the targeted transformation table has been used; and a unused-entry manager for loading unused entries of the targeted transformation table into the cache memory by referencing the management table. Ng is relied on for the teaching of having a management table containing a plurality of management entries, each corresponding to the entries of the targeted transformation table, each management entry indicating whether a corresponding entry of the targeted transformation table has been used; and a unused-entry manager for loading unused entries of the targeted transformation table into the cache memory by referencing the management table (Ng: col. 2, lines 59-61; Fig. 2; Fig. 5; col. 5, lines 9-67). It would have been obvious to one of ordinary skill in the art at the time of the invention to employ the use of having a management table containing a plurality of management entries, each corresponding to the entries of the targeted transformation table, each management entry indicating whether a corresponding entry of the targeted transformation table has been used; and a unused-entry manager for loading unused entries of the targeted transformation table into the cache memory by referencing the management table in the system of Page, as Ng teaches, so as to efficiently allocate and configure memory segments for responding to host commands (Ng: col. 1, lines 39-42).

***Allowable Subject Matter***

12. Claims 3 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior arts of record do not disclose the entry loading section loads all transformation tables into the cache memory, wherein the targeted transformation table is loaded after the other transformation tables have been loaded into the cache memory.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minh Dieu Nguyen whose telephone number is 571-272-3873.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emmanuel Moise can be reached on 571-272-3865. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number:  
10/669,269  
Art Unit: 2137

Page 10

MinhDieu Nguyen  
mdn  
11/28/07

A handwritten signature in black ink, appearing to read 'Nguyen Minh Dieu', written in a cursive style.